Final

Site Investigation Report
Drain Field (Building T-459), Parcel 236(Q)

Fort McClellan
Calhoun County, Alabama

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Table of Contents

Table of Contents (Continued)

Page

List of Appendices

List of Tables

List of Figures

Executive Summary

In accordance with Contract No. DACA21-96-D-0018, Task Order CK05, IT Corporation (IT) completed a site investigation (SI) at the Drain Field (Building T-459), Parcel 236(Q), at Fort McClellan, in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site and, if present, whether the concentrations present an unacceptable risk to human health or the environment. The SI at the Drain Field (Building T-459), Parcel 236(Q), consisted of the sampling and analysis of two surface soil samples, two subsurface soil samples, and two groundwater samples. In addition, two temporary groundwater monitoring wells were installed in the residuum groundwater zone to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information.

Chemical analysis of samples collected at the Drain Field (Building T-459), Parcel 236(Q), indicates that metals, volatile organic compounds (VOC), and semivolatile organic compounds (SVOC) were detected in the various site media. Pesticides, herbicides, and polychlorinated biphenyls were not detected in any of the samples collected. To evaluate whether the detected constituents pose an unacceptable risk to human health or the environment, analytical results were compared to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for Fort McClellan.

The potential threat to human receptors is expected to be low. Although the site is projected for industrial reuse, the analytical data were screened against residential human health SSSLs to evaluate the site for possible unrestricted future land use. In soils, with the exception of iron in one subsurface soil sample, the metals concentrations that exceeded SSSLs were below their respective background concentration or within the range of background values. In groundwater, several metals were detected at concentrations exceeding SSSLs and background concentrations. However, both of the groundwater samples had high turbidity at the time of sample collection, which caused the elevated metals results. VOC and SVOC concentrations in site media were below SSSLs.

The potential threat to ecological receptors is also expected to be minimal. With the exception of selenium in one of the surface soil samples, the metals concentrations that exceeded ESVs were below their respective background concentration or within the range of background values. VOC and SVOC concentrations in site media were below ESVs. Based on the low levels of metals and chemical compounds detected, the potential threat to ecological receptors is very low.

Based on the results of the SI, past operations at the Drain Field (Building T-459), Parcel 236(Q), do not appear to have adversely impacted the environment. The metals and chemical constituents detected in site media do not pose an unacceptable risk to human health and the environment. Therefore, IT Corporation recommends "No Further Action" and unrestricted land reuse at the Drain Field (Building T-459), Parcel 236(Q).

1.0 Introduction

The U.S. Army has selected Fort McClellan (FTMC) located in Calhoun County, Alabama, for closure by the Base Realignment and Closure (BRAC) Commission under Public Laws 100-526 and 101-510. The 1990 Base Closure Act, Public Law 101-510, established the process by which U.S. Department of Defense (DOD) installations would be closed or realigned. The BRAC Environmental Restoration Program requires investigation and cleanup of federal properties prior to transfer to the public domain. The U.S. Army is conducting environmental studies of the impact of suspected contaminants at parcels at FTMC under the management of the U.S. Army Corps of Engineers (USACE), Mobile District. The USACE contracted with IT Corporation (IT) to perform the site investigation (SI) of the Drain Field (Building T-459), Parcel 236(Q), under Contract Number DACA21-96-D-0018, Task Order CK05.

This SI report presents specific information and results compiled from the SI, including field sampling and analysis and monitoring well installation activities conducted at the Drain Field (Building T-459), Parcel 236(Q).

1.1 Project Description

The Drain Field (Building T-459), Parcel 236(Q), was identified as an area to be investigated prior to property transfer. The letter "Q" designates the parcel as a Community Environmental Response Facilitation Act (CERFA) Category 1 Qualified Parcel in the environmental baseline survey (EBS) (Environmental Science and Engineering, Inc. [ESE], 1998). Category 1 sites are areas where no storage, release, or disposal of hazardous substances or petroleum products has occurred (including migration). The parcel does not have a history of environmental hazards, such as asbestos, lead-based paint, polychlorinated biphenyls (PCB), radon, radionuclides, unexploded ordnance, or chemical warfare material.

A site-specific field sampling plan (SFSP) attachment (IT, 1998a) and a site-specific safety and health plan (SSHP) attachment were finalized in December 1998. The SFSP and SSHP were prepared to provide technical guidance for sample collection and analysis at the Drain Field (Building T-459), Parcel 236(Q). The SFSP was used in conjunction with the SSHP as attachments to the installation-wide work plan (IT, 1998b) and the installation-wide sampling and analysis plan (SAP) (IT, 2000a). The SAP includes the installation-wide safety and health plan (SHP) and quality assurance plan (QAP).

The SI included fieldwork to collect two surface soil samples, two subsurface soil samples, and two groundwater samples to determine whether potential site-specific chemicals are present at the site, and to provide data useful for supporting any future corrective measures and closure activities.

1.2 Purpose and Objectives

The SI program was designed to collect data from site media and provide a level of defensible data and information in sufficient detail to determine whether chemical constituents are present at the Drain Field (Building T-459), Parcel 236(Q), and if present, whether the concentrations present an unacceptable risk to human health or the environment. The conclusions of the SI in Chapter 6.0 are based on the comparison of the analytical results to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for FTMC. The SSSLs and ESVs were developed by IT as part of the human health and ecological risk evaluations associated with SIs being performed under the BRAC Environmental Restoration Program at FTMC. The SSSLs and ESVs are presented in the *Final Human Health and Ecological Screening Values and PAH Background Summary Report* (IT, 2000b). Background metals screening values are presented in the *Final Background Metals Survey Report, Fort McClellan, Alabama* (Science Applications International Corporation [SAIC], 1998).

Based on conclusions presented in this SI report, the BRAC Cleanup Team will decide either to propose “No Further Action” at the site or to conduct additional work at the site.

1.3 Site Description and History

The Drain Field (Building T-459), Parcel 236(Q), is located in the northern portion of the Main Post of FTMC (Figure 1-1). The site is located south of the eastern end of Reilly Airfield near the intersection of 10th Street and an unnamed road (Figure 1-2). The site is a septic system with a drain field located between former Building T-459 and 10th Street. A concrete building foundation was observed to the east of an unimproved road near the site. Based on its location, the concrete foundation is believed to be the remains of Building T-459. The septic system, which is believed to have been constructed in the 1940s, received domestic sewage from Buildings T-407 (classrooms), T-406 (latrine), and associated buildings (T-449, T-451, T-452, T-461, and T-459).

The parcel encompasses approximately 1.5 acres and is densely covered with trees and groundcover. Because of the dense foliage, the drain field and septic tank location reported in the EBS could not be determined during an IT site visit. An unimproved road and a cleared area (approximately 1 acre) are in the center of the area designated as the location of the septic system. Major surface drainage features were not observed at the site. Ground surface slopes to the west-southwest toward 10th Street.

2.0 Previous Investigations

An EBS was conducted by ESE to document current environmental conditions of all FTMC property (ESE, 1998). The study was to identify sites that, based on available information, have no history of contamination and comply with DOD guidance for fast-track cleanup at closing installations. The EBS also provides a baseline picture of FTMC properties by identifying and categorizing the properties by seven criteria:

1. Areas where no storage, release, or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas)

2. Areas where only release or disposal of petroleum products has occurred

3. Areas where release, disposal, and/or migration of hazardous substances has occurred, but at concentrations that do not require a removal or remedial response

4. Areas where release, disposal, and/or migration of hazardous substances has occurred, and all removal or remedial actions to protect human health and the environment have been taken

5. Areas where release, disposal, and/or migration of hazardous substances has occurred, and removal or remedial actions are underway, but all required remedial actions have not yet been taken

6. Areas where release, disposal, and/or migration of hazardous substances has occurred, but required actions have not yet been implemented

7. Areas that are not evaluated and/or require additional evaluation.

The EBS was conducted in accordance with the Community Environmental Response Facilitation Act (CERFA) (CERFA-Public Law 102-426) protocols and DOD policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, the Alabama Department of Environmental Management (ADEM), the U.S. Environmental Protection Agency (EPA) Region IV, and Calhoun County, as well as a database search of Comprehensive Environmental Response, Compensation, and Liability Act-regulated substances, petroleum products, and Resource Conservation and Recovery Act-regulated facilities. Available historic maps and aerial photographs were reviewed to document historic land uses. Personal and telephone interviews of past and present FTMC employees and military personnel were conducted. In addition, visual site inspections were conducted to verify conditions of specific property parcels.

The parcel does not have a history of environmental hazards, such as asbestos, radon, lead-based paint, radionuclides, unexploded ordnance, PCBs, or chemical warfare materials. The Drain Field (Building T-459), Parcel 236(Q), was identified as a site where further evaluation was needed. Previous environmental studies to document environmental conditions have not been conducted at this site.

3.0 Current Site Investigation Activities

This chapter summarizes SI activities conducted by IT at the Drain Field (Building T-459), Parcel 236(Q), including environmental sampling and analysis and groundwater monitoring well installation activities.

3.1 Environmental Sampling

The environmental sampling performed during the SI at the Drain Field (Building T-459), Parcel 236(Q), consisted of collecting two surface soil samples, two subsurface soil samples, and two groundwater samples for chemical analysis. The sample locations were determined by noting site physical characteristics during a site walkover, and by reviewing historical documents pertaining to activities conducted at the site. The sample locations, media, and rationale are summarized in Table 3-1. Sampling locations are shown on Figure 3-1. Samples were submitted for laboratory analyses of site-related parameters listed in Section 3.3. Surface and subsurface soil samples were not analyzed for organophosphorous (OP) pesticides as originally requested because laboratory quality assurance/quality control (QA/QC) criteria were out of limits. Therefore, these samples were subsequently recollected and submitted for OP pesticides analysis only.

3.1.1 Surface Soil Sampling

Two surface soil samples were collected during the SI at the Drain Field (Building T-459), Parcel 236(Q), at the locations shown on Figure 3-1. Soil sampling locations and rationale are presented in Table 3-1. Sample designations and QA/QC samples are listed in Table 3-2. Surface soil sample locations were determined in the field by the on-site geologist based on the sampling rationale, the presence of surface structures, site topography, and buried utilities.

Sample Collection. Surface soil samples were collected from the upper 1 foot of soil with a split-spoon sampler and hollow-stem auger (sample location PPMP-236Q-GP01) or a 3-inch diameter stainless-steel hand auger (sample location PPMP-236Q-GP02), using the methodology specified in Section 4.9.1.1 of the SAP (IT, 2000a). Surface soil samples were collected by first removing surface debris, such as fill material or vegetation, from the immediate sample area. The soil was then collected with the sampling device and screened with a photoionization detector (PID) in accordance with Section 4.7.1.1 of the SAP (IT, 2000a). Samples for volatile organic compound (VOC) analysis were collected directly from the sampler using three EnCore® samplers. The remaining portion of the sample was transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.3. Sample collection logs are included in Appendix A.

3.1.2 Subsurface Soil Sampling

Subsurface soil samples were collected from two soil borings at the Drain Field (Building T-459), Parcel 236(Q), as shown on Figure 3-1. Subsurface soil sampling locations and rationale are presented in Table 3-1. Subsurface soil sample designations and depths are listed in Table 3-2. Soil boring sample locations were determined in the field by the on-site geologist based on sampling rationale, site topography, and buried and overhead utilities. IT contracted Miller Drilling Inc., to assist in subsurface soil sample collection.

Sample Collection. Subsurface soil samples were collected from soil borings at depths greater than 1 foot below ground surface (bgs) in the unsaturated zone. The soil borings were advanced and soil samples collected using split-spoon samplers and the hollow-stem auger sampling procedures specified in Section 4.9.1.1 of the SAP (IT, 2000a). Sample collection logs are included in Appendix A.

Subsurface soil samples were collected continuously to 12 feet bgs. Samples were field screened using a PID in accordance with Section 4.7.1.1 of the SAP (IT, 2000a) to measure for volatile organic vapors. The soil sample displaying the highest reading was selected and sent to the laboratory for analysis; however, at those locations where PID readings were not greater than background, the deepest soil sample interval above the saturated zone was submitted for analysis. Samples to be analyzed for VOCs were collected directly from the split-spoon sampler using three EnCore samplers. The remaining portion of the sample was transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.3. The on-site geologist constructed a detailed boring log for each soil boring. The lithological log for each borehole is included in Appendix B.

3.1.3 Well Installation

Two temporary wells were installed in the residuum groundwater zone at the Drain Field (Building T-459), Parcel 236(Q), to collect groundwater samples for laboratory analysis. The well/groundwater sample locations and rationale are shown on Figure 3-1. Table 3-3 summarizes construction details of the temporary wells installed at the site. The well construction logs are included in Appendix B.

IT contracted Miller Drilling, Inc., to install the temporary wells using a hollow-stem auger drill rig at the locations shown on Figure 3-1. The wells were installed following procedures outlined in Section 4.7 and Appendix C of the SAP (IT, 2000a). The boreholes at these locations were advanced with a 4.25-inch inside diameter (ID) hollow-stem auger from ground surface to the first water-bearing zone in the residuum. A 2-foot-long, 2-inch ID carbon steel split-spoon sampler was driven to collect residuum for observing and describing lithology. Soil samples were continuously collected from ground surface to 12 feet bgs, and at 5-foot intervals beyond 12 feet bgs to the final depth of the boring. The auger was advanced until the first water-bearing zone was encountered. The on-site geologist logging the auger boreholes continued the lithological log for each borehole from 12 feet bgs to the bottom of the auger borehole by logging the split-spoon samples and auger drill cuttings. The drill cuttings were logged to determine lithologic changes and the approximate depth of groundwater encountered during drilling. This information was used to determine the optimal placement of the monitoring well screen interval and to provide site-specific geologic and hydrogeologic information. The lithological log for each borehole is included in Appendix B.

Upon reaching the target depth in the temporary wells, a 15-foot length of 2-inch ID, 0.010-inch factory slotted, Schedule 40 polyvinyl chloride (PVC) screen with a 3-inch PVC end cap was placed through the auger to the bottom of the borehole. The screen and end cap were attached to 2-inch ID, flush-threaded Schedule 40 PVC riser. A sand pack consisting of number 1 filter sand (environmentally safe, clean fine sand, sieve size 20 to 40) was tremied around the well screen to approximately 2 feet above the top of the well screen as the augers were removed. The wells were surged using a solid PVC surge block for approximately 10 minutes, or until no more settling of the sand pack occurred inside the borehole. A bentonite seal, consisting of approximately 2 feet of bentonite pellets, was placed immediately on top of the sand pack and hydrated with potable water. If the bentonite seal was installed below the water table surface, the bentonite pellets were allowed to hydrate in the groundwater. Bentonite seal placement and hydration followed procedures in Appendix C of the SAP (IT, 2000a). The temporary well surface completion included attaching plastic sheeting around the PVC riser using duct tape. Additionally, sandbags were used to secure the sheeting to the ground surface around the temporary well. A locking well cap was placed on the PVC well casing.

The wells were developed by surging and pumping with a submersible pump in accordance with methodology outlined in Section 4.8 and Appendix C of the SAP (IT, 2000a). The submersible pump used for well development was moved in an up-and-down fashion to encourage any residual well-installation materials to enter the well. These materials were then pumped out of the well in order to re-establish the natural hydraulic flow conditions. Development continued until the water turbidity was equal to or less than 20 nephelometric turbidity units, or for a maximum of 4 hours. The well development logs are included in Appendix C.

3.1.4 Water Level Measurements

The depth to groundwater was measured in the monitoring wells at the Drain Field (Building T-459), Parcel 236(Q), on March 13, 2000, following procedures outlined in Section 4.18 of the SAP (IT, 2000a). Depth to groundwater was measured with an electronic water-level meter. The meter probe and cable were cleaned after use at each well following decontamination methodology presented in Section 4.10 of the SAP (IT, 2000a). Measurements were referenced to the top of the PVC casing. A summary of groundwater level measurements is presented in Table 3-4.

3.1.5 Groundwater Sampling

Groundwater samples were collected from the two temporary wells installed at the Drain Field (Building T-59), Parcel 236(Q), at the locations shown on Figure 3-1. The groundwater sampling locations and rationale are listed in Table 3-1. The groundwater sample designations and QA/QC samples are listed in Table 3-5.

Sample Collection. Groundwater sampling was performed at the temporary monitoring well locations following procedures outlined in Section 4.9.1.4 of the SAP (IT, 2000a). Groundwater was sampled after purging a minimum of three well volumes and after field parameters (i.e., temperature, pH, dissolved oxygen, specific conductivity, oxidation-reduction potential, and turbidity) stabilized. Purging was performed with a polyethylene bailer. Samples were collected using a Teflon™ bailer. Field parameters were measured using a calibrated water-quality meter. Field parameter readings are summarized in Table 3-6. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-5 using methods outlined in Section 3.3.

3.2 Surveying of Sample Locations

Sample locations were surveyed using global positioning system survey techniques described in Section 4.3 of the SAP (IT, 2000a), and conventional civil survey techniques described in Section 4.19 of the SAP (IT, 2000a). Horizontal coordinates were referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983. Elevations were referenced to the North American Vertical Datum of 1988. Horizontal coordinates and elevations are included in Appendix D.

3.3 Analytical Program

Samples collected during the SI were analyzed for various chemical and physical parameters. The specific suite of analyses performed was based on the potential site-specific chemicals historically at the site and EPA, ADEM, FTMC, and USACE requirements. Target analyses for samples collected at the Drain Field (Building T-459), Parcel 236(Q), included the following parameters:

- Target compound list (TCL) VOCs – EPA Method 5035/8260B
- TCL semivolatile organic compounds (SVOC) – EPA Method 8270C
- Target analyte list metals – EPA Method 6010B/7000
- Chlorinated pesticides – EPA Method 8081A
- OP pesticides – EPA Method 8141A
- Chlorinated herbicides – EPA Method 8151A
- PCBs – EPA Method 8082.

The samples were analyzed using EPA SW-846 methods, including Update III methods where applicable, as presented in Table 6-1 in Appendix B of the SAP (IT, 2000a). Data were reported and evaluated in accordance with Corps of Engineers South Atlantic Savannah Level B criteria (USACE, 1994) and the stipulated requirements for the generation of definitive data (Section 3.1.2 of Appendix B of the SAP [IT, 2000a]). Chemical data were reported via hard-copy data packages by the laboratory, using Contract Laboratory Program-like forms. These packages were validated in accordance with EPA National Functional Guidelines by Level III criteria. A summary of validated data is included in Appendix E. The Data Validation Summary Report is included as Appendix F.

3.4 Sample Preservation, Packaging, and Shipping

Sample preservation, packaging, and shipping followed requirements specified in Section 4.13.2 of the SAP (IT, 2000a). Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SI are listed in Section 5.0, Table 5-1, of Appendix B of the SAP (IT, 2000a). Sample documentation and chain-of-custody records were recorded as specified in Section 4.13 of the SAP (IT, 2000a).

Completed analysis request and chain of custody records (Appendix A) were secured and included with each shipment of sample coolers to Quanterra Environmental Services in Knoxville, Tennessee. Split samples were shipped to the USACE South Atlantic Division Laboratory in Marietta, Georgia.

3.5 Investigation-Derived Waste Management and Disposal

Investigation-derived waste (IDW) was managed and disposed as outlined in Appendix D of the SAP (IT, 2000a). The IDW generated during the SI at the Drain Field (Building T-459), Parcel 236(Q), was segregated as follows:

- Drill cuttings
- Purge water from well development and sampling activities, and decontamination fluids
- Spent well materials and personal protective equipment.

Solid IDW was stored inside the fenced area surrounding Buildings 335 and 336 in lined rolloff bins prior to characterization and final disposal. Solid IDW was characterized using toxicity characteristic leaching procedure analysis. Based on the results, drill cuttings, spent well materials, and personal protective equipment generated during the SI were disposed as nonregulated waste at the Industrial Waste Landfill on the Main Post of FTMC.

Liquid IDW was contained in the existing 20,000-gallon sump associated with the Building T-338 vehicle washrack. Liquid IDW was characterized by VOC, SVOC, and metals analyses. Based on the analyses, liquid IDW was discharged as nonregulated waste to the FTMC wastewater treatment plant on the Main Post.

3.6 Variances/Nonconformances

There were not any variances or nonconformances to SFSP recorded during completion of the SI at the Drain Field (Building T-459), Parcel 236(Q).

3.7 Data Quality

The field sample analytical data are presented in tabular form in Appendix E. The field samples were collected, documented, handled, analyzed, and reported in a manner consistent with the SI work plan; the FTMC SAP and quality assurance plan; and standard, accepted methods and procedures. Sample collection logs pertaining to the collection of these samples were reviewed and organized for this report and are included in Appendix A.

Data Validation. A complete (100 percent) Level III data validation effort was performed on the reported analytical data. Appendix F consists of a data validation summary report that was prepared to discuss the results of the validation. Selected results were rejected or otherwise qualified based on the implementation of accepted data validation procedures and practices. These qualified parameters are highlighted in the report. The validation-assigned qualifiers were added to the FTMC IT Environmental Management System™ database for tracking and reporting. The qualified data were used in the comparison to the SSSLs, ESVs, and background screening values for FTMC. Rejected data (assigned an "R" qualifier) were not used in the comparison to the SSSLs, ESVs, and background screening values.

The data presented in this report, except where qualified, meet the principle data quality objective for this SI.

4.0 Site Characterization

Subsurface investigations performed at the Drain Field (Building T-459), Parcel 236(Q), provided soil, bedrock, and groundwater data used to characterize the geology and hydrogeology of the site.

4.1 Regional and Site Geology

4.1.1 Regional Geology

Calhoun County includes parts of two physiographic provinces, the Piedmont Upland Province and the Valley and Ridge Province. The Piedmont Upland Province occupies the extreme eastern and southeastern portions of the county and is characterized by metamorphosed sedimentary rocks. The generally accepted range in age of these metamorphics is Cambrian to Devonian.

The majority of Calhoun County, including the Main Post of FTMC, lies within the Appalachian fold-and-thrust structural belt (Valley and Ridge Province) where southeastward-dipping thrust faults with associated minor folding are the predominant structural features. The fold-and-thrust belt consists of Paleozoic sedimentary rocks that have been asymmetrically folded and thrust-faulted, with major structures and faults striking in a northeast-southwest direction.

Northwestward transport of the Paleozoic rock sequence along the thrust faults has resulted in the imbricate stacking of large slabs of rock referred to as thrust sheets. Within an individual thrust sheet, smaller faults may splay off the larger thrust fault, resulting in imbricate stacking of rock units within an individual thrust sheet (Osborne and Szabo, 1984). Geologic contacts in this region generally strike parallel to the faults and repetition of lithologic units is common in vertical sequences. Geologic formations within the Valley and Ridge Province portion of Calhoun County have been mapped by Warman and Causey (1962), Osborne and Szabo (1984), and Moser and DeJarnette (1992), and vary in age from Lower Cambrian to Pennsylvanian.

The basal unit of the sedimentary sequence in Calhoun County is the Cambrian Chilhowee Group. The Chilhowee Group consists of the Cochran, Nichols, Wilson Ridge, and Weisner Formations (Osborne and Szabo, 1984) but in Calhoun County is either undifferentiated or divided into the Cochran and Nichols Formations and an upper undifferentiated Wilson Ridge and Weisner Formation. The Cochran is composed of poorly sorted arkosic sandstone and conglomerate with interbeds of greenish-gray siltstone and mudstone. Massive to laminated greenish-gray and black mudstone makes up the Nichols Formation, with thin interbeds of siltstone and very fine-grained sandstone (Szabo et al., 1988). These two formations are mapped only in the eastern part of the county.

The Wilson Ridge and Weisner Formations are undifferentiated in Calhoun County and consist of both coarse-grained and fine-grained clastics. The coarse-grained facies appears to dominate the unit and consists primarily of coarse-grained, vitreous quartzite, and friable, fine- to coarse-grained, orthoquartzitic sandstone, both of which locally contain conglomerate. The fine-grained facies consists of sandy and micaceous shale and silty, micaceous mudstone which are locally interbedded with the coarse clastic rocks. The abundance of orthoquartzitic sandstone and quartzite suggests that most of the Chilhowee Group bedrock in the vicinity of FTMC belongs to the Weisner Formation (Osborne and Szabo, 1984).

The Cambrian Shady Dolomite overlies the Weisner Formation northeast, east and southwest of the Main Post and consists of interlayered bluish-gray or pale yellowish-gray sandy dolomitic limestone and siliceous dolomite with coarsely crystalline porous chert (Osborne et al., 1989). A variegated shale and clayey silt have been included within the lower part of the Shady Dolomite (Cloud, 1966). Material similar to this lower shale unit was noted in core holes drilled by the Alabama Geologic Survey on FTMC (Osborne and Szabo, 1984). The character of the Shady Dolomite in the FTMC vicinity and the true assignment of the shale at this stratigraphic interval are still uncertain (Osborne, 1999).

The Rome Formation overlies the Shady Dolomite and locally occurs to the northwest and southeast of the Main Post as mapped by Warman and Causey (1962) and Osborne and Szabo (1984), and immediately to the west of Reilly Airfield (Osborne and Szabo, 1984). The Rome Formation consists of variegated, thinly interbedded grayish-red-purple mudstone, shale, siltstone, and greenish-red and light gray sandstone, with locally occurring limestone and dolomite. The Conasauga Formation overlies the Rome Formation and occurs along anticlinal axes in the northeastern portion of Pelham Range (Warman and Causey, 1962), (Osborne and Szabo, 1984) and the northern portion of the Main Post (Osborne et al., 1997). The Conasauga Formation is composed of dark-gray, finely to coarsely crystalline medium- to thick-bedded dolomite with minor shale and chert (Osborne et al., 1989).

Overlying the Conasauga Formation is the Knox Group, which is composed of the Copper Ridge and Chepultepec dolomites of Cambro-Ordovician age. The Knox Group is undifferentiated in Calhoun County and consists of light medium gray, fine to medium crystalline, variably bedded to laminated, siliceous dolomite and dolomitic limestone that weather to a chert residuum (Osborne and Szabo, 1984). The Knox Group underlies a large portion of the Pelham Range area.

The Ordovician Newala and Little Oak Limestones overlie the Knox Group. The Newala Limestone consists of light to dark gray, micritic, thick-bedded limestone with minor dolomite. The Little Oak Limestone is comprised of dark gray, medium- to thick-bedded, fossiliferous, argillaceous to silty limestone with chert nodules. These limestone units are mapped together as undifferentiated at FTMC and other parts of Calhoun County. The Athens Shale overlies the Ordovician limestone units. The Athens Shale consists of dark-gray to black shale and graptolitic shale with localized interbedded dark gray limestone (Osborne et al., 1989). These units occur within an eroded "window" in the uppermost structural thrust sheet at FTMC and underlie much of the developed area of the Main Post.

Other Ordovician-aged bedrock units mapped in Calhoun County include the Greensport Formation, Colvin Mountain Sandstone, and Sequatchie Formation. These units consist of various siltstones, sandstones, shales, dolomites and limestones, and are mapped as one, undifferentiated unit in some areas of Calhoun County. The only Silurian-age sedimentary formation mapped in Calhoun County is the Red Mountain Formation. This unit consists of interbedded red sandstone, siltstone, and shale with greenish-gray to red silty and sandy limestone.

The Devonian Frog Mountain Sandstone consists of sandstone and quartzitic sandstone with shale interbeds, dolomudstone, and glauconitic limestone (Szabo et al., 1988). This unit locally occurs in the western portion of Pelham Range.

The Mississippian Fort Payne Chert and the Maury Formation overlie the Frog Mountain Sandstone and are composed of dark- to light-gray limestone with abundant chert nodules and greenish-gray to grayish-red phosphatic shale, with increasing amounts of calcareous chert toward the upper portion of the formation (Osborne and Szabo, 1984). These units occur in the northwestern portion of Pelham Range. Overlying the Fort Payne Chert is the Floyd Shale, also of Mississippian age, which consists of thin-bedded, fissile brown to black shale with thin intercalated limestone layers and interbedded sandstone. Osborne and Szabo (1984) reassigned the Floyd Shale, which was mapped by Warman and Causey (1962) on the Main Post of FTMC, to the Ordovician Athens Shale on the basis of fossil data.

The Jacksonville Thrust Fault is the most significant structural geologic feature in the vicinity of FTMC, both for its role in determining the stratigraphic relationships in the area and for its contribution to regional water supplies. The trace of the fault extends northeastward for approximately 39 miles between Bynum, Alabama and Piedmont, Alabama. The fault is interpreted as a major splay of the Pell City Fault (Osborne and Szabo, 1984). The Ordovician sequence that makes up the Eden thrust sheet is exposed at FTMC through an eroded "window", or "fenster", in the overlying thrust sheet. Rocks within the window display complex folding, with the folds being overturned and tight to isoclinal. The carbonates and shales locally exhibit well-developed cleavage (Osborne and Szabo, 1984). The FTMC window is framed on the northwest by the Rome Formation, north by the Conasauga Formation, northeast, east, and southwest by the Shady Dolomite, and southeast and southwest by the Chilhowee Group (Osborne et al., 1997).

4.1.2 Site Geology

Soils at the Drain Field (Building T-459), Parcel 236(Q), are mapped as the Cumberland gravelly loam, 2 to 6 percent slopes, and eroded-type soil (CoB2) (U.S. Department of Agriculture, 1961). The soil encountered during the hollow-stem auger drilling activities at the Drain Field (Building T-459), Parcel 236(Q), ranged from a yellowish-brown to dark reddish-brown to dark brown mottled, dark reddish yellow to black clay with sand and gravel.

The bedrock at the site is mapped as the Cambrian Conasauga Formation (Osborne et al., 1997). The Conasauga Formation overlies the Rome Formation and occurs along the northern portion of the Main Post (Osborne et al., 1997). The Conasauga Formation is composed of dark-gray, finely to coarsely crystalline medium- to thick-bedded dolomite with minor shale and chert (Osborne et al., 1989). Bedrock was not encountered during drilling.

4.2 Site Hydrology

4.2.1 Surface Hydrology

Precipitation in the form of rainfall averages about 54 inches annually in Anniston, Alabama, with infiltration rates annually exceeding evapotranspiration rates (U.S. Department of Commerce, National Oceanic and Atmospheric Administration, 1998). The major surface water features at the Main Post of FTMC include Remount Creek, Cane Creek, and Cave Creek. These waterways flow in a generally northwest to westerly direction towards the Coosa River on the western boundary of Calhoun County.

Site elevation at the Drain Field (Building T-459), Parcel 236(Q), is approximately 750 feet above mean sea level. The land surface at the site gently slopes to the west-southwest toward 10th Street. No major surface drainage features are present at the site.

4.2.2 Hydrogeology

Static groundwater levels were measured in the temporary monitoring wells at the Drain Field (Building T-459), Parcel 236(Q), and in wells at adjacent Parcel 231(7) on March 13, 2000 (Table 3-4). Groundwater elevations were calculated by measuring the depth to groundwater relative to the surveyed top-of-casing elevations. Figure 4-1 is a groundwater elevation map constructed from the March 2000 groundwater elevation data. Based on the groundwater elevation map, groundwater flow at the site is to the southwest.

5.0 Summary of Analytical Results

The results of the chemical analysis of samples collected at the Drain Field (Building T-459), Parcel 236(Q), indicate that metals, VOCs, and SVOCs were detected in the various site media. Pesticides, herbicides, and PCBs were not detected in any of the samples collected at the site. To evaluate whether the detected constituents present an unacceptable risk to human health and the environment, analytical results were compared to the human health SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC.

Metal concentrations exceeding the SSSLs and ESVs were subsequently compared to metals background screening values (background concentrations) (SAIC, 1998) to determine if the metals concentrations are within natural background concentrations. Summary statistics for background metals samples collected at FTMC (SAIC, 1998) are included in Appendix G.

Six compounds were quantified by both SW-846 Method 8260B (as VOC) and Method 8270C (as SVOC), namely, 1,2,4-trichlorobenzene, 1,4-dichlorobenzene, 1,3-dichlorobenzene, 1,2-dichlorobenzene, hexachlorobutadiene, and naphthalene. Method 8260B yields a reporting limit (RL) of 0.005 milligrams per kilogram (mg/kg), while Method 8270C has a reporting limit of 0.330 mg/kg, which is typical for a soil matrix sample. Because of the direct nature of the Method 8260B analysis and its resulting lower RL, this method should be considered superior to Method 8270C when quantifying low levels (0.005 to 0.330 mg/kg) of these compounds. Method 8270C and its associated methylene chloride extraction step is superior, however, when dealing with samples that contain higher concentrations of these compounds (greater than 0.330 mg/kg). Therefore, all data were considered and none were categorically excluded. Data validation qualifiers were helpful in evaluating the usability of data, especially if calibration, blank contamination, precision, or accuracy indicator anomalies were encountered. The validation qualifiers and concentrations reported (e.g., whether concentrations were less than or greater than 0.330 mg/kg) were used to determine which analytical method was likely to return the more accurate result.

The following sections and Tables 5-1 through 5-3 summarize the results of the comparison of detected constituents to the SSSLs, ESVs, and background screening values. Complete analytical results are presented in Appendix E.

5.1 Surface Soil Analytical Results

Two surface soil samples were collected for chemical analysis at the Drain Field (Building T-459), Parcel 236(Q). Surface soil samples were collected from the upper 2 feet of soil at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs, ESVs, and metals background screening values, as presented in Table 5-1.

Metals. Nineteen metals were detected in the surface soil samples collected at the Drain Field, (Building T-459), Parcel 236(Q). The concentrations of six metals (aluminum, arsenic, chromium, iron, manganese, and vanadium) exceeded SSSLs. Of these metals, iron (PPMP-236Q-GP01), manganese (PPMP-236Q-GP02), and vanadium (PPMP-236Q-GP01) concentrations also exceeded their respective background concentration but were within the range of background values determined by SAIC (1998) (Appendix G).

The following metals were detected at concentrations exceeding ESVs and their respective background concentration: barium (PPMP-236Q-GP02), iron (PPMP-236Q-GP01), manganese (PPMP-236Q-GP02), mercury (PPMP-236Q-GP01), selenium (both locations), and vanadium (PPMP-236Q-GP01). With the exception of one selenium result, these metals concentrations values were within the range of background values determined by SAIC (1998) (Appendix G). The selenium concentration (1.4 mg/kg) at PPMP-236Q-GP01 exceeded the range of background values (1.3 mg/kg).

Volatile Organic Compounds. Acetone and methylene were detected in surface soil samples collected at the Drain Field (Building T-459), Parcel 236(Q). The methylene chloride results were flagged with a “B” data qualifier, signifying that methylene chloride was also detected in an associated laboratory or field blank sample.

The VOC concentrations in surface soils were below SSSLs and ESVs.

Semivolatile Organic Compounds. Two SVOCs (di-n-butyl phthalate and bis[2-ethylhexyl]phthalate) were detected in the surface soil sample collected at PPMP-236Q-GP01.

The analytical results were flagged with a “B” data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank sample. SVOCs were not detected at sample location PPMP-236Q-GP02.

The SVOC concentrations in surface soils were below SSSLs and ESVs.

5.2 Subsurface Soil Analytical Results

Two subsurface soil samples were collected for chemical analysis at the Drain Field (Building T-459), Parcel 236(Q). Subsurface soil samples were collected at depths greater than 1 foot bgs at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and metals background concentrations, as presented in Table 5-2.

Metals. Nineteen metals were detected in subsurface soil samples collected at the Drain Field (Building T-459), Parcel 236(Q). The concentrations of six metals (aluminum, arsenic, chromium, iron, manganese, and vanadium) exceeded SSSLs. Of these metals, the concentrations of arsenic (PPMP-236Q-GP01), iron (PPMP-236Q-GP01), manganese (PPMP-236Q-GP01), and vanadium (both locations) also exceeded their respective background concentration. With the exception of the iron result, these metal concentrations were within the range of background values determined by SAIC (1998) (Appendix G). The iron concentration (68,700 mg/kg) at PPMP-236Q-GP01 exceeded the range of background values (4,840 mg/kg to 48,000 mg/kg).

Volatile Organic Compounds. Acetone and methylene chloride were detected in both of the subsurface soil samples collected at the Drain Field (Building T-459), Parcel 236(Q). The acetone results were flagged with a “J” data qualifier, indicating that the results were greater than the method detection limit (MDL) but less than the RL. The methylene chloride results were flagged with a “B” data qualifier, signifying that the compound was also detected in an associated laboratory or field blank sample.

The VOC concentrations in subsurface soils were below SSSLs.

Semivolatile Organic Compounds. The SVOC bis(2-ethylhexyl)phthalate was detected in the subsurface soil sample collected at PPMP-236Q-GP01. The bis(2-ethylhexyl)phthalate result was flagged with a “B” data qualifier, signifying that the compound was also detected in an associated laboratory or field blank sample.

The bis(2-ethylhexyl)phthalate concentration was below the SSSL.

5.3 Groundwater Analytical Results

Two temporary monitoring wells were sampled at the Drain Field (Building T-459), Parcel 236(Q), at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and metals background concentrations, as presented in Table 5-3.

Metals. Nineteen metals were detected in the groundwater samples collected at the Drain Field (Building T-459), Parcel 236(Q). The majority of the metals results were flagged with a “J” data qualifier, signifying that the results were greater than the MDL but less than the RL. The thallium results were flagged with a “B” data qualifier, signifying that thallium was also detected in an associated laboratory or field blank sample.

The concentrations of nine metals exceeded SSSLs and background concentrations. However, both of the groundwater samples had high turbidity (greater than 1000 NTUs) at the time of sample collection. To evaluate the effects of turbidity on metal concentrations in groundwater at FTMC, IT resampled five wells that previously had high turbidity using a low-flow groundwater purging and sampling technique to reduce turbidity to below 10 NTUs. The resampling effort demonstrated that the concentrations of most metals in the lower turbidity samples were significantly lower (by 1 to 2 orders of magnitude) than in the higher turbidity samples (IT, 2000c) (Appendix H). Consequently, the elevated metals results in the groundwater samples collected at the Drain Field (Building T-459), Parcel 236(Q), were likely the result of high turbidity.

Volatile Organic Compounds. Chloromethane was detected in the groundwater sample collected at sample location PPMP-236Q-GP02. The chloromethane concentration (0.00012 milligrams per liter [mg/L]) was below the SSSL (0.0039 mg/L).

Semivolatile Organic Compounds. SVOCs were not detected in the groundwater samples collected at the Drain Field (Building T-459), Parcel 236(Q).

6.0 Summary, Conclusions, and Recommendations

IT, under contract with USACE, completed an SI at the Drain Field (Building T-459), Parcel 236(Q), at FTMC in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site and, if present, whether the concentrations present an unacceptable risk to human health or the environment. The SI at the Drain Field (Building T-459), Parcel 236(Q), consisted of the sampling and analysis of two surface soil samples, two subsurface soil samples, and two groundwater samples. In addition, two temporary monitoring wells were installed in the residuum groundwater zone to facilitate groundwater sample collection and provide site-specific geological and hydrogeological characterization information.

Chemical analysis of samples collected at the Drain Field (Building T-459), Parcel 236(Q), indicates that metals, VOCs, and SVOCs were detected in the various site media. Pesticides, herbicides, and PCBs were not detected in any of the samples collected. Analytical results were compared to the human health SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC. Additionally, metal concentrations exceeding SSSLs and ESVs were compared to media-specific background screening values (SAIC, 1998).

The potential threat to human receptors is expected to be low. Although the site is projected for industrial reuse, the analytical data were screened against residential human health SSSLs to evaluate the site for possible unrestricted future land use. In soils, with the exception of iron in one subsurface soil sample, the metals concentrations that exceeded SSSLs were below their respective background concentration or within the range of background values determined by SAIC (1998). In groundwater, several metals were detected at concentrations exceeding SSSLs and background concentrations. However, both of the groundwater samples had high turbidity (greater than 1000 NTUs) at the time of sample collection, which caused the elevated metals results. VOC and SVOC concentrations in site media were below SSSLs.

The potential threat to ecological receptors is also expected to be minimal. With the exception of selenium in one of the surface soil samples, the metals concentration that exceeded ESVs were below their respective background concentration or within the range of background values. VOC and SVOC concentrations in site media were below ESVs. Based on the low levels of metals and chemical compounds detected, the potential threat to ecological receptors is very low.

Based on the results of the SI, past operations at the Drain Field (Building T-459), Parcel 236(Q), do not appear to have adversely impacted the environment. The metals and chemical constituents detected in site media do not pose an unacceptable risk to human health and the environment. Therefore, IT Corporation recommends “No Further Action” and unrestricted land reuse at the Drain Field (Building T-459), Parcel 236(Q).

7.0 References

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ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

APPENDIX A

SAMPLE COLLECTION LOGS AND ANALYSIS REQUEST/CHAIN-OF-CUSTODY RECORDS

SAMPLE COLLECTION LOGS

ANALYSIS REQUEST/CHAIN-OF-CUSTODY RECORDS

APPENDIX B

BORING LOGS AND WELL CONSTRUCTION LOGS

BORING LOGS

WELL CONSTRUCTION LOGS

APPENDIX C

WELL DEVELOPMENT LOGS

APPENDIX D

SURVEY DATA

APPENDIX E

SUMMARY OF VALIDATED ANALYTICAL DATA

APPENDIX F

DATA VALIDATION SUMMARY REPORT

APPENDIX G

SUMMARY STATISTICS FOR BACKGROUND MEDIA, FORT McCLELLAN, ALABAMA

APPENDIX H

GROUNDWATER RESAMPLING RESULTS